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A new species of *Plagiopholis* Boulenger, 1893 (Serpentes, Pseudoxenodontinae) from southeastern Yunnan, China

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Abstract

A new species of the genus *Plagiopholis* is described based on a single specimen collected from Wenshan Prefecture, southeastern Yunnan Province, China. Compared with other species of the genus, it has a unique combination of morphological characteristics: one loreal, six supralabials, 2+2 temporals, smooth anterior dorsal scales and feebly keeled posterior dorsal scales, 116 ventral scales, 32 subcaudal scales, some subcaudal scales being paired and some being unpaired, an inverted "V" shaped nuchal blotch, and a yellowish white ventral surface with many small dark spots. Phylogenetically, the new species formed a distinct clade in the genus and diverged from other species of the genus by 8.6%–16.6% in the mitochondrial cytochrome b gene. This study increases the number of valid species of the genus *Plagiopholis* to eight.

Key Words

cytb, morphology, Mountain Snake, systematics, taxonomy

Introduction

The genus *Plagiopholis* Boulenger, 1893 is a group of semi-fossorial, small non-venomous snakes currently containing seven species, namely *P. acuta* Xu, Ma & Cai, 2025, *P. blakewayi* Boulenger, 1893, *P. delacouri* Angel, 1929, *P. maculosa* Qi, Song, Yang, Xu, Fang, Su & Wang, 2025, *P. nuchalis* (Boulenger, 1893), *P. pluvialis* Cai, Xu & Ma, 2025, and *P. styani* (Boulenger, 1899) (Uetz et al. 2026). This genus received little scientific attention for nearly a hundred years until more recently, when several new species were described (Cai et al. 2025; Liu et al. 2025; Qi et al. 2025). Although species of this genus are widely distributed, they are rarely collected, and many species of this genus are known only from the holotype (Qi et al. 2025; Uetz et al. 2026).

During our recent field work in Yunnan Province, China, one specimen of *Plagiopholis* was collected from Wenshan Prefecture. Detailed morphological comparison and molecular analyses revealed that this specimen represents a previously unknown taxon. Therefore, we describe this specimen as a new species of *Plagiopholis* herein.

Materials and methods

The snake was found freshly dead on a road. After being photographed, the specimen was preserved in approximately 75% ethanol and deposited at Kunming Natural History Museum of Zoology, Kunming Institute of Zoology, Chinese Academy of Sciences (KIZ).

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Total genomic DNA was extracted from liver tissue. A fragment of mitochondrial cytochrome b (cytb) gene was amplified and sequenced using the primers L14910: 5'–GACCTGTGATMTGAAAACCAYCGTT–3' and H16064: 5'–CTTTGGTTTACAAGAACAATGCTTTA–3' (Burbrink et al. 2000). The amplification and sequencing were completed by Sangon Biotech (Shanghai) Co., Ltd. A total of 26 cytb sequences, comprising the sequence of the newly collected specimen and sequences of the six known species of *Plagiopholis* and an outgroup species *Pseudoxenodon bambusicola* Vogt, 1922, were included in the phylogenetic analyses according to Qi et al. (2025). The new sequence has been deposited in GenBank and other sequences used in this study were obtained from GenBank and GenBase (Table 1).

Sequences were aligned using MAFFT (Katoh and Standley 2013). Pairwise distances between species were calculated in MEGA 12.0.9 (Kumar et al. 2024). The best substitution model HKY+F+G4 was selected under the Bayesian Information Criterion in ModelFinder (Kalyaanamoorthy et al. 2017). Bayesian inference was performed in MrBayes 3.2.7 (Ronquist et al. 2012) via 5,000,000 generations of the Markov chains with sampling every 100 generations and maximum likelihood phylogenetic analysis was performed in IQ-TREE 1.6.12 (Nguyen et al. 2015) via 1000 ultrafast bootstrap replicates.

Measurements of the body and tail were taken with a ruler to the nearest 1 mm, and measurements on the head were taken with digital calipers to the nearest 0.1 mm. Values for symmetric head characters are given in left/right order. Measurement and scale count methodology followed Qi et al. (2025): SVL, snout-vent length, from the tip of the snout to the posterior margin of the cloacal plate; TaL, tail length, from the posterior margin of the cloacal plate to the tip of the tail; TL, total length; HL, head length, from the tip of the snout to the posterior margin of the mandible; HW, maximum head width; ED, horizontal eye diameter; DSR, dorsal scale rows, at one head length behind the head-at the midbody-at one head length before the vent; V, ventrals; PrC, precloacal plate; SC, subcaudals; LoR, loreal; PrO, preoculars; PtO, postoculars; SPL, supralabials; IFL, infralabials; and TMP, temporals.

For morphological comparison, the morphological data of other species of the genus were obtained from the following literature: Boulenger (1893, 1899), Angel (1929), Smith (1943), Zhao et al. (1978), Li (1986), Zhong et al. (2015), Cai et al. (2025), Liu et al. (2025), and Qi et al. (2025).

Results

Bayesian inference and maximum likelihood analysis yielded a consistent topology (Fig. 1). The sequence of the newly collected specimen from Wenshan Prefecture formed a distinct lineage sister to a clade containing *Plagiopholis pluvialis*, *P. acuta*, and *P. styani* with strong support by Bayesian inference (posterior probability 1.00) and weak support by maximum likelihood analysis (ultrafast bootstrap 91). The uncorrected pairwise distance between the sequence of the newly collected specimen and the sequences of other species of *Plagiopholis* ranged from 8.6% (vs *P. styani*) to 16.6% (vs *P. nuchalis*) (Table 2).

Table 1. Samples used for the phylogenetic analyses in this study.

Species	Voucher	Locality	Accession
Plagiopholis yangi sp. nov.	KIZ2025059	China: Yunnan: Wenshan	PZ163173
Plagiopholis acuta	QHU2024009	China: Hunan: Xinshao	PV340623
Plagiopholis acuta	QHU2024011	China: Hunan: Xinshao	PV340625
Plagiopholis acuta	QHU2024012	China: Hunan: Xinshao	PV340626
Plagiopholis acuta	QHU2024044	China: Hunan: Xinshao	PV340627
Plagiopholis blakewayi	HS11148	China: Yunnan: Mengzi	MK201341
Plagiopholis blakewayi	10-Jun	China: Yunnan	MK201340
Plagiopholis blakewayi	SYSr002136	China: Yunnan: Wenshan	PV340636
Plagiopholis blakewayi	SYSr002207	China: Sichuan: Yanbian	PV340637
Plagiopholis maculosa	SYSr002979	China: Guangdong: Ruyuan	C_AA126388
Plagiopholis nuchalis	QHU2024045	China: Yunnan: Xishuangbanna	PV340638
Plagiopholis nuchalis	MS853	China: Yunnan: Pu'er	PV340639
Plagiopholis pluvialis	HS09028	China: Sichuan: Mianyang	MK201336
Plagiopholis pluvialis	YBU13224	China: Guizhou: Tongren	KT199002
Plagiopholis pluvialis	EM1906004	China: Sichuan: Leshan	MW697084
Plagiopholis pluvialis	GP833	China: Sichuan: Anzhou	KT199000
Plagiopholis pluvialis	QHU2024006	China: Sichuan: Dujiangyan	PV340628
Plagiopholis pluvialis	QHU2024007	China: Sichuan: Wenchuan	PV340629
Plagiopholis pluvialis	CIBXMG2023001	China: Sichuan: Dujiangyan	PV340630
Plagiopholis pluvialis	CIB119370	China: Sichuan: Emeishan	PV340632
Plagiopholis pluvialis	SYSr002035	China: Guizhou: Bijie	PV340635
Plagiopholis styani	KIZ20180002	China: Fujian: Wuyishan	PV847831
Plagiopholis styani	CIBWYS2024001	China: Jiangxi: Yanshan	PV340620
Plagiopholis styani	ZJFRR202407001	China: Zhejiang: Huzhou	PV340621
Plagiopholis styani	ZJFRR202207001	China: Zhejiang: Hangzhou	PV340622
Pseudoxenodon bambusicola	CIB010247	China: Fujian: Quanzhou	MK238278

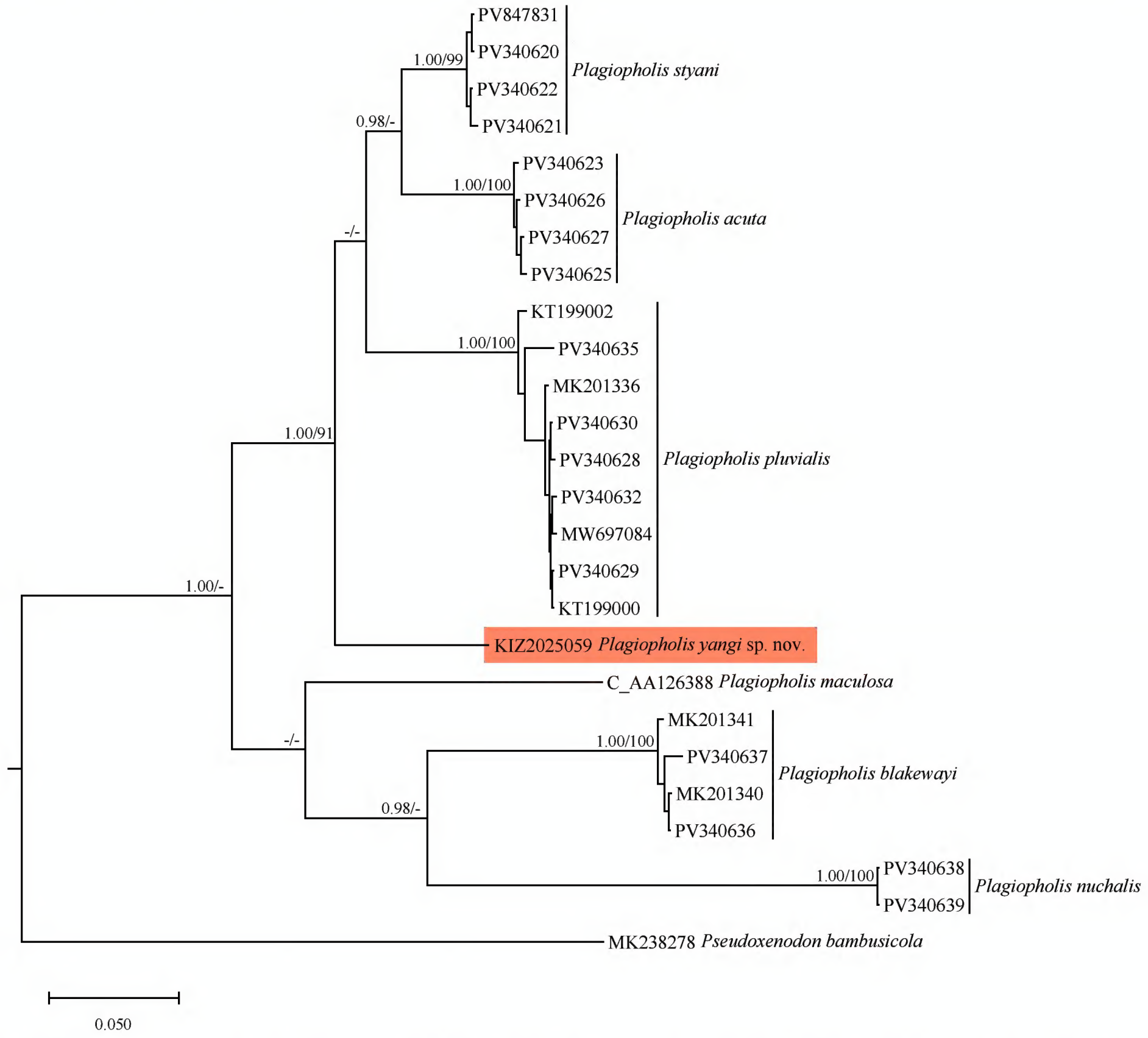

Figure 1. Bayesian phylogram of the genus *Plagiopholis* inferred from cytb sequences. Node labels before and after "/" indicate Bayesian posterior probabilities and maximum likelihood ultrafast bootstrap values (values below 0.90/90 are not shown), respectively.

Table 2. Uncorrected pairwise genetic distances (%) based on cytb sequences.

	1	2	3	4	5	6
1 *Plagiopholis acuta*						
2 *Plagiopholis blakewayi*	15.8					
3 *Plagiopholis maculosa*	14.4	14.9				
4 *Plagiopholis nuchalis*	16.5	16.1	15.3			
5 *Plagiopholis pluvialis*	9.3	14.5	14.0	16.7		
6 *Plagiopholis styani*	6.2	14.2	14.6	16.3	8.5	
7 *Plagiopholis yangi* sp. nov.	9.7	14.3	13.7	16.6	10.7	8.6

Plagiopholis yangi sp. nov.

https://zoobank.org/F5BFE7CC-A570-463A-AADD-17E8282A0B93

Figs 2–4; Table 3

Type material. ***Holotype.*** KIZ2025059, adult male, collected on 6 May 2025 by Local villagers from Xiajinchang Township, Malipo County, Wenshan Prefecture, Yunnan Province, China (23°13'24"N, 104°48'11"E; 1,450 m a.s.l.).

Diagnosis. *Plagiopholis yangi* sp. nov. differs from all its congeners by a combination of the following characteristics (Table 4): anterior dorsal scales smooth, posterior dorsal scales feebly keeled; loreal present; supralabials six; temporals 2+2; ventral scales 116 in a single male; subcaudal scales 32 in a single male, some paired and some unpaired; nuchal blotch inverted "V" shaped; ventral surface yellowish white with many small dark spots.

Plagiopholis yangi sp. nov. can be distinguished from *P. acuta* by the presence of loreal (vs loreal absent), more subcaudals (32 vs 24–30), an inverted "V" shaped nuchal blotch (vs pentagonal or sub-annular shaped), and feebly keeled posterior dorsals (vs all dorsals smooth); from *P. blakewayi* by the presence of loreal (vs loreal absent, rarely present), six supralabials (vs five, rarely six), 2+2 temporals (vs 0+1 or 1+1), and an inverted "V" shaped nuchal blotch (vs arrow-shaped, irregular, or absent); from *P. delacouri* by the presence of loreal (vs loreal absent), 2+2 temporals (vs 1+2), more subcaudals (32 vs 20–28), and some unpaired subcaudals (vs all subcaudals paired);

Figure 2. The holotype (KIZ2025059) of *Plagiopholis yangi* sp. nov. in preservative. **A.** Dorsal view; **B.** Ventral view.

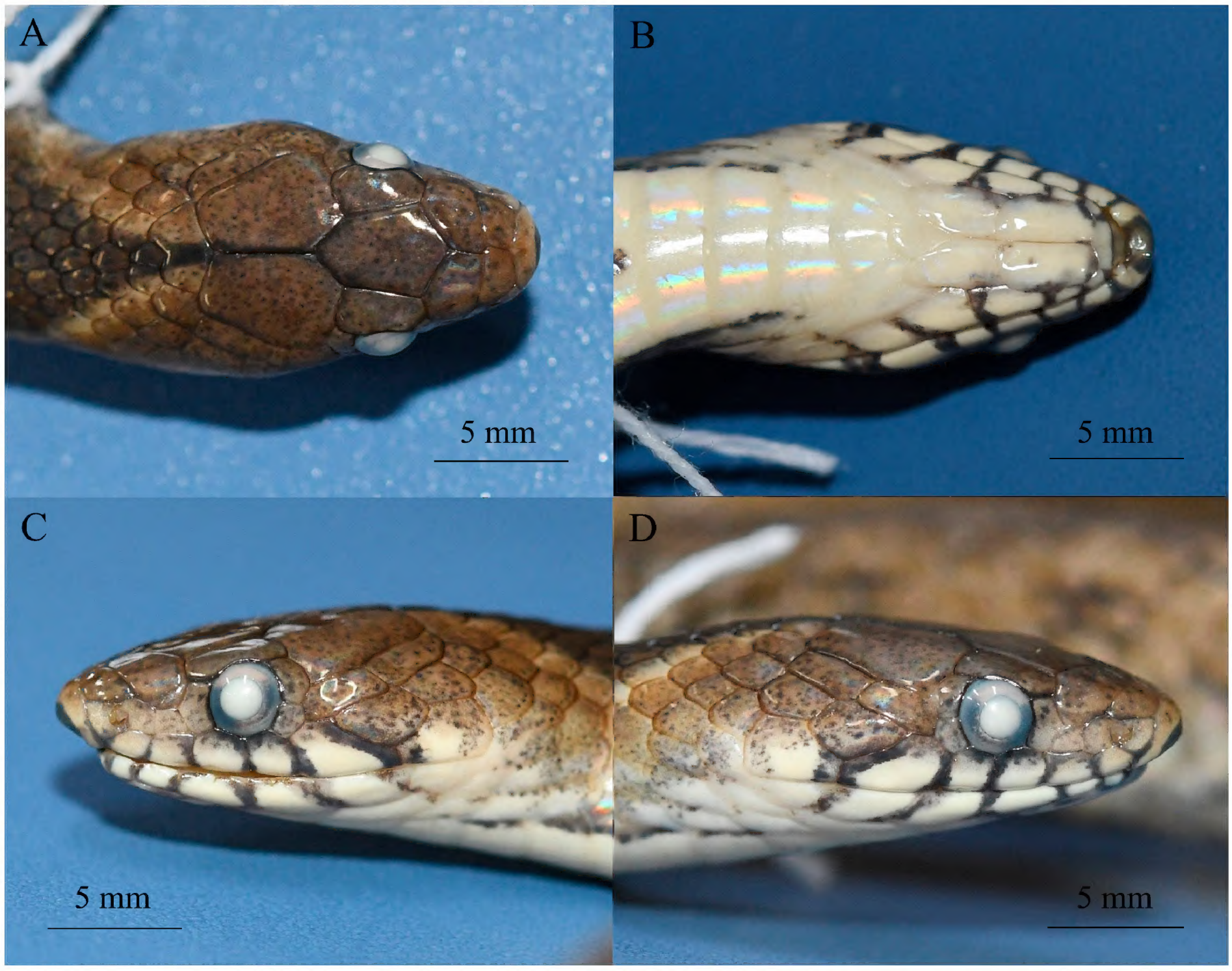

Figure 3. Close-up views of the head of the holotype (KIZ2025059) of *Plagiopholis yangi* sp. nov. in preservative. **A.** Dorsal view; **B.** Ventral view; **C.** Left view; **D.** Right view.

Table 3. Measurements (in mm) and scalation data of the holotype of *Plagiopholis yangi* sp. nov. Abbreviations see Materials and methods.

	KIZ2025059		KIZ2025059
SVL	313	PrC	undivided
TaL	56	SC	32
TL	369	LoR	1/1
HL	16.3	PrO	1/1
HW	9.6	PtO	2/2
ED	2.6	SPL	6/6
DSR	15-15-15	IFL	6/6
V	116	TMP	2+2/2+2

from *P. maculosa* by the presence of loreal (vs loreal absent), more ventrals (116 vs 104), more subcaudals (32 vs 24), some unpaired subcaudals (vs all subcaudals paired), feebly keeled posterior dorsals (vs all dorsals smooth), and the absence of large brown blotches on ventral neck (vs present); from *P. nuchalis* by 2+2 temporals (vs 1+2), fewer ventrals (116 vs 122–142), more subcaudals (32 vs 23–30), and the absence of large black blotches on venter (vs present); from *P. pluvialis* by the presence of loreal (vs loreal absent, rarely present), more ventrals in males (116 vs 102–110), and feebly keeled posterior dorsals (vs all dorsals smooth); from *P. styani* by the presence of loreal (vs loreal absent, rarely present), more subcaudals (32 vs 23–30), an inverted "V" shaped nuchal blotch (vs pentagonal, sub-annular or sagittate shaped), and feebly keeled posterior dorsals (vs all dorsals smooth).

Etymology. The specific epithet is in commemoration of the late renowned Chinese herpetological taxonomist Prof. Dr. Datong Yang. We suggest "Yang's Mountain Snake" as the common English name and "杨氏颈斑蛇" as the common Chinese name.

Description of holotype. Adult male; body stubby, SVL 313 mm, tail short, TaL 56 mm, TaL/TL 0.15; head small, HL 16.3 mm, narrow, HW/HL 0.59, indistinct from neck; snout narrow, tip blunt; eye moderate, ED 2.6 mm, ED/HL 0.16, pupil round; rostral large, rectangular, wider than high, visible from above; internasals wider than long; prefrontals polygonal; frontal shield shaped, longer than wide; supraocular elongated triangular; parietals large, gradually narrower posteriorly, median suture longer than length of frontal; nostril located in middle of nasal, nasal divided into two scales; loreal small, one on each side; preocular large, one on each side; postoculars two on each side; six supralabials on each side, first in contact with nasal, second in contact with loreal, third and fourth entering orbit; two anterior temporals and two posterior temporals on each side; mental small, rectan-

Figure 4. The holotype (KIZ2025059) of *Plagiopholis yangi* sp. nov. when it was just discovered. **A.** Dorsal view; **B.** Ventral view.

gular, wider than long; two pairs of chin shields, anterior pairs longer than posterior; six infralabials on each side, first pair not contacting each other, first to third in contact with anterior pair of chin shields, third and fourth in contact with posterior chin shields; dorsal scales in 15 rows throughout, anterior dorsals smooth, posterior dorsals feebly keeled; ventral scales 116, excluding two preventrals; subcaudal scales 32, first, third, and fifth to tenth single, others paired; precloacal plate undivided.

Coloration of holotype in life. Dorsal surface yellowish brown, a large black inverted "V" shaped nuchal blotch on neck, many indistinct irregular black stripes on dorsum; lateral surface of head light brown, upper and lower lips white with vertical black stripes; ventral surface of head white, ventral surface of body yellowish white with many small brown spots, ventral surface of tail light yellow with some small light brown spots.

Distribution. *Plagiopholis yangi* sp. nov. is currently known to be only distributed in Malipo County, Wenshan Prefecture, Yunnan Province, China (Fig. 5). It is speculated that it may also be distributed in nearby Ha Giang Province of northern Vietnam.

Ecology notes. The specimen of the new species was discovered dead on a road. However, no signs of inju-

Table 4. Differeniation characteristics among the species of the genus *Plagiopholis*. DS: dorsal scales, NB: nuchal blotch, N/A: not available, other abbreviations see Materials and methods.

	***Plagiopholis yangi* sp. nov.**	***Plagiopholis acuta***	***Plagiopholis blakewayi***	***Plagiopholis delacouri***	***Plagiopholis maculosa***	***Plagiopholis nuchalis***	***Plagiopholis pluvialis***	***Plagiopholis styani***
SPL	6	6, rarely 7	5, rarely 6	6	6	6	6	6, rarely 7
IFL	6	6	6, rarely 4 or 5	N/A	6	6	6	6, rarely 5
LoR	1	0	0, rarely 1	0	0	1	0, rarely 1	0, rarely 1
PrO	1	1	1	1	1	1	1	1
PtO	2	2	2, rarely 1	2	2	2	2	2
TMP	2+2	2+2	0+1 or 1+1	1+2	2+2	1+2	2+2, rarely 2+1	2+2, rarely 2+1
V	116	114–121	107–132	113–129	104	122–142	102–122	114–122
SC	32, some paired and some unpaired	24–30	17–31, some paired and some unpaired	22–28, all paired	24, all paired	23–30	16–31	23–30
DS	Anterior ones smooth, posterior ones feebly keeled	All smooth	N/A	N/A	All smooth	N/A	All smooth	All smooth
NB	Inverted "V"-shaped	Pentagonal or sub-annular shaped	Arrow-shaped, irregular, or absent	Inverted "V"-shaped	Inverted "V"-shaped	Inverted "V"-shaped	Inverted "V"-shaped	Pentagonal, sub-annular or sagittate shaped

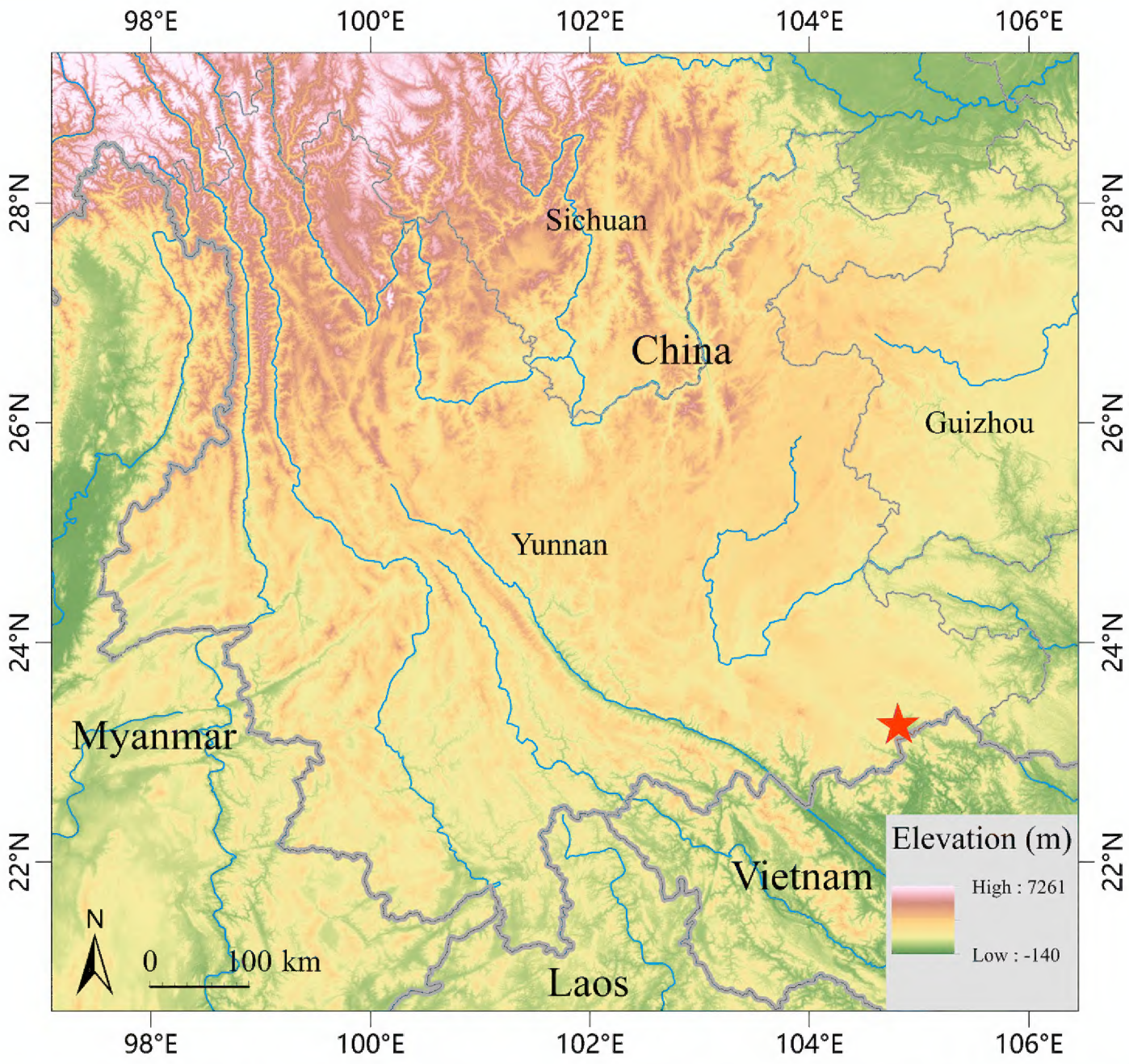

Figure 5. Map showing the type locality of *Plagiopholis yangi* sp. nov. in Malipo County, Wenshan Prefecture, Yunnan Province, China (red star).

ry were visible, and the cause of its death is unknown. The specimen was not decomposed or dried out when it was found, suggesting that it had just died. There are evergreen broad-leaved forests on sides of the road and farmlands nearby. Other snakes distributed in the same area include *Achalinus zugorum* Miller, Davis, Luong, Do, Pham, Ziegler, Lee, De Queiroz, Reynolds & Nguyen, 2020, *Lycodon flavozonatus* (Pope, 1928), *Ovophis makazayazaya* (Takahashi, 1922), *Ptyas major* (Günther, 1858), and *Trimeresurus stejnegeri* Schmidt, 1925.

Discussion

Zhao et al. (1978) described *Plagiopholis unipostocularis* Zhao & Huang, 1978 on the basis of a specimen from Yunnan Province of China, and the detail locality is unknown. Zhong et al. (2015) relegated *P. unipostocularis* to the synonymy of *P. blakewayi*. Because of the conservative morphology, the species diversity of this genus was seriously underestimated (Cai et al. 2025; Liu et al. 2025; Qi et al. 2025). We consider

that *P. unipostocularis* may represent a valid species and will be removed from the synonym of *P. blakewayi*. *Plagiopholis yangi* sp. nov. can be distinguished from *P. unipostocularis* by the presence of loreal (vs loreal absent), 2+2 temporals (vs 0+1), six supralabials (vs five), two postoculars (vs one), fewer ventrals (116 vs 132), and more subcaudals (32 vs 17).

There is another synonym of *P. blakewayi*, namely *Oligodon kunmingensis* Kou & Wu, 1993, whose type locality is also in Yunnan (Kou and Wu 1993; Uetz et al. 2026). According to the original description, we agree that *O. kunmingensis* belongs to the genus *Plagiopholis*, but we speculate that it may also be a valid species. We confirm that *Plagiopholis yangi* sp. nov. is not conspecific with *O. kunmingensis* due to the presence of a loreal (vs loreal absent), 2+2 temporals (vs 0+1), six supralabials (vs five), more subcaudals (32 vs 23–24), and the presence of a nuchal blotch (vs nuchal blotch absent).

Due to the cryptic habits, species of *Plagiopholis* are rarely encountered. Therefore, many species of this genus were described based on a single specimen (Uetz et al. 2026). Similarly, we only obtained one specimen from Wenshan Prefecture. However, its distinctive morphological characteristics and the significant genetic divergence between it and its congeners are sufficient to confirm that the specimen from Wenshan Prefecture is a new species. In the future, field surveys should be strengthened to clarify the distribution range and population status of this new species.

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